Remarks

Claims 21-27 and 29-42 are pending. Favorable reconsideration is respectfully requested.

The invention is directed to hydraulically setting, inorganic binder-based construction adhesives, i.e. cements, mortars, etc., which contain a specific vinyl ester copolymer having a narrow and critical range of 0.2 to 1.5 weight percent of copolymerized monomers having a water solubility greater than vinyl acetate, based on the weight of the copolymer.

It is customary to add vinyl ester and other polymers and copolymers to cementitious adhesives for improving their workability and set properties, for example tensile strength. It is also desirable, in general, to render the cured ("set") products more water resistant, and hydrophobic comonomers have been copolymerized into the base polymers to provide this result. The inventors have surprisingly discovered that the properties of hydraulically setting adhesives and of the set articles prepared therefrom be considerably improved by the copolymerization of hydrophilic comonomers, but only over a very narrow range of 0.2 to 1.5 weight percent, preferably 0.5 to 1.0 weight percent. This result is contrary to the generally accepted wisdom of the art, which as stated previously, is to copolymerize hydrophobic comonomers.

The claims have been rejected under 35 U.S.C. § 112 ¶¶ 1 and 2 as set forth in the Office Action on pages 2 and 3, numbered paragraphs 2 and 4. With respect to the rejection as set forth in paragraph 2 of the Office Action, the range of hydrolysis of "less than 95 mol percent," the claim has been reworded to recite "less than or equal to 95 mol percent." Polyvinyl alcohol polymers, as is well known, are prepared by hydrolyzing polyvinyl acetate polymers. When the degree of hydrolysis is greater than 95 mol percent, the polymers are considered "fully hydrolyzed." When the degree of hydrolysis is 95% or less, the copolymers are "partially hydrolyzed." At page 8, lines 1 and 2 it is indicated that "partially hydrolyzed"

polymers or fully hydrolyzed polymers are to be used. At page 8, lines 3-5, the degree of hydrolysis is stated to be preferably 80-95 mol percent. The upper end of the range of claim 1 is taken from 95%, while the lower end is from the broad description of "partially hydrolyzed." No issue of new matter therefore arises. Withdrawal of the rejection of claim 21 under 35 U.S.C. § 112 ¶ 1 is solicited.

With respect to paragraph 4(A) of the Office Action, claim 21 has been amended to recite that the percentages by weight referenced by the Examiner are with respect to the total weight of the construction adhesive. Claim 21 has also been amended to correct a drafting error, by reciting 0.5 to 60 weight percent of polymer "solids." Thus, consistent with the language appearing earlier in the claim, the polymer may be added in the form of an aqueous dispersion, or in the form of a redispersible polymer powder prepared by drying such a dispersion. Regardless of which form of addition is employed, the polymer solids should be between 0.5 and 6.0 weight percent relative to the total weight of the construction adhesive composition ingredients.

With respect to paragraph 4(B) of the Office Action, claim 28 has been cancelled. With respect to paragraph 4(C), the range of the 80-95% of partial hydrolysis further limits the scope of claim 21 to use of a polyvinyl alcohol having this range of hydrolysis, which is indeed a narrower range than claimed in claim 21. The language of claim 21 has been amended to include 95% hydrolysis.

Claims 21-40 (21-27, 29-40) have been rejected under 35 U.S.C. § 102(e) and/or 103(a) over Geissler U.S. Patent 6,331,587 B1. Applicants respectfully traverse this rejection. *Geissler* is not directed to the problem solved by Applicants, improving water resistance of construction materials employing polymer additives, but rather is directed to the problem of supplying high solids aqueous dispersions of relatively low viscosity. *Geissler* solves this problem by employing water soluble cationic azo polymerization initiators (catalysts) rather than the conventional redox-type initiators.

Geissler discloses numerous optional comonomers beginning at column 2, line 48 to column 3, line 3. In the paragraph beginning at column 2, line 61, two classes of hydrophilic monomers are disclosed, ethylenically unsaturated monocarboxylic acids and ethylenically unsaturated dicarboxylic acids, useful in amounts of up to 5% by weight (column 3, line 2); preferably 0.1 to 5% by weight. However, *Geissler* never employed such monomers in any example, much less in Applicants' critical range of 0.2 to 1.5 weight percent. Moreover, the list of monomers said to be suitable in amounts of up to 5% by weight also include hydrophobic monomers such as the diesters of dicarboxylic acids. As with *Schilling, Geissler* was completely unaware that portions of hydrophilic monomers within the claimed range, could result in such a great improvement in water resistance of construction adhesives.

It is well established that the problem solved is highly relevant to patentability. In the case of *In re Shaffer*, 108 USPQ 326 (CCPA 1956), for example, the CCPA clearly stated that a reference which does not discuss the problem addressed cannot suggest a solution to the problem, and is not an obviousness-defeating reference under 35 USC § 103. This precept certainly applies to *Geissler*, which does not address water resistance of construction adhesives, but is directed to an entirely different problem, solved in an entirely different way.

Water resistance is a noteworthy problem in construction adhesives such as tile adhesives, and is the problem addressed by Applicants. One skilled in the art, seeking to solve this problem, would receive no guidance from *Geissler*, who does not even mention the problem. Since hydrophilic monomers are expected to encourage water absorption, were one motivated to produce a *Geissler*-type polymer (using cationic azo initiators) and to experiment to increase water resistance, one skilled in the art would be motivated to modify the polymer by incorporating hydrophobic monomers such as those disclosed by *Geissler* at column 2, lines 48-60. Moreover, even had one so skilled been motivated to employ ethylenically unsaturated carboxylic acids, and had chosen an amount squarely in the midrange of *Geissler's* 0.1 to 5 weight percent, i.e. 2.5 weight percent, this skilled artisan would have found that water resistance decreased, rather than increased. Only within the critical range of 0.2 to 1.5 weight percent is any significant improvement obtained.

This is not a case where the prior art (*Geissler*) discloses an example falling within the claimed range, but failed to recognize any benefit. Rather, *Geissler* never prepared any composition within the claimed range. One skilled in the art, desirous of increasing water resistance of construction adhesive polymer additives, would not be directed to the present invention by *Geissler*. Although *Geissler* discloses a range of certain monomers (not all of which are hydrophilic, i.e. dicarboxylic acid diesters) which includes Applicants' claimed range, *Geissler* provides no motivation, first, to select hydrophilic monomers, and second, to use those monomers only in the critical claimed range of 0.2 to 1.5 weight percent. Thus, *Geissler* does not anticipate the claimed subject matter, nor does he render this subject matter obvious.[1] The present invention is a narrow "selection" invention which provides highly unexpected results, and as such is patentable over *Geissler*. Withdrawal of the rejections over *Geissler* under 35 USC §§ 102 and 103 is solicited.

While the holding of *In re Shaffer* should be enough to dictate a holding of patentability in this case, there are other cases which the Examiner may also wish to consider. After all, the patentability of a range within a broader range disclosed by the prior art is long and clearly established. The subject invention claims require that the polymer additive contain a narrow and critical range of hydrophilic monomer, 0.2 to 1.5 weight percent. This range is not described as a preferred range, but is an outside range beyond which the improvements offered by the subject invention do not occur. Rather, the preferred range of hydrophilic monomer is the yet narrower range of 0.5 to 1.0 weight percent.

In the case of *In re Sponnoble*, 160 USPQ 237, 243 (CCPA 1969), the court stated:

> [a] patentable invention, within the ambit of 35 U.S.C. 103 *may* result even if the inventor *has*, in effect, merely combined features, old in the art, for their known purpose, without producing anything beyond the results inherent in their use. Although we believe that appellant, here, has actually done more

[1] As stated in *In re Kalm*, 154 USPQ 10 (CCPA 1967), a reference which does not render an invention obvious cannot anticipate under 35 USC § 102.

> than this *in making his combination*, we also believe that a more proper, albeit not exclusive, inquiry *in a case such as this* is to look further as to the *reasons* for making the combination.
>
> It should not be necessary for this court to point out that a patentable invention may lie in the discovery of the source of a problem even though the remedy may be obvious once the source of the problem is identified. This is *part* of the "subject matter as a whole" which should always be considered in determining the obviousness of an invention under 35 U.S.C. 103.

The Court then added further:

> The issue, then, is whether the teachings of the prior art would, *in and of themselves and without the benefits of appellant's disclosure*, make the invention as a whole, obvious.

Sponnoble at 243 (emphasis in the original). Note that *Sponnoble* mirrors the language of *Shaffer*, in that the problem solved is crucial to the determination of non-obviousness.

Here, *Geissler* is not directed to improving the water resistant properties of construction adhesives, but rather is denoted to improving the polymerization of monomers used to prepare his dispersions, by employing a water soluble azo initiator. Mindful of the last paragraph of *Sponnoble* cited above, *Geissler* does not direct the skilled artisan to the present invention. *Geissler* clearly and unambiguously discloses a preference for employing vinyl esters exclusively, without any additional comonomers (column 3, line 6 and all examples), and if comonomers are employed, to use exclusively neutral and anionic monomers (column 3, lines 7-8). A large list of neutral comonomers is given at column 2, lines 48-60, yet *Geissler* chose not to use even any of these in his examples. The range of unsaturated carboxylic acid monomers listed at column 2, lines 61ff, include hydrophobic monomers as well as hydrophilic monomers, and at column 3, lines 1-2, the range of 0.1 to 5 weight percent of these monomers is largely inoperable to produce the improvements discovered by Applicants. How can it be said that *Geissler* suggests the present invention, when some 75% of compositions of hydrophilic monomers will not work?

Also instructive is *Ex parte Selby*, 153 USPQ 476 (POBA 1966). *Selby* is particularly appropriate, as it also concerns addition polymers. In *Selby*, claims were directed to an interpolymer (copolymer) of methyl methacrylate, 2-ethylhexyl acrylate, and methacrylic acid. The rejection was over the *Straughan* patent, which disclosed overlapping ranges:

	Selby (%)	Straughan (%)
methyl methacrylate	65.5-71.5	25-90, pref. 50-85
2-ethylhexyl acrylate	27-33	10-60
Methacrylic acid	1.5-2.5	1-10, pref. 2-7

However, the Board indicated that *Straughan* did not exemplify a product within *Selby's* ranges (as is the case here; *Geissler* did not exemplify a product within Applicant's range), and *Selby's* specification indicated the criticality of the proportions used. Therefore, the Board reversed the rejection of the claims. The present inventor has clearly set forth the critical nature of the claimed range. An amount of only 0.2 weight percent of the hydrophilic monomers causes a distinct and unexpected improvement over an otherwise similar polymer not containing the hydrophilic monomers. The effect is at its maximum at about 0.5 to 1.0 weight percent, and by 1.5 weight percent the rate of decline of properties is already such that by 2.0 weight percent, substantially no improvement in properties or even a decrease in properties over the base polymer is observed. As with *Selby*, the invention clearly meets the requirements of 35 U.S.C. § 103(a).

The same result was obtained in *In re Waymouth*, 182 USPQ 290 (CCPA 1974). In *Waymouth*, the intensity of white light from a mercury vapor lamp was increased by including a halogen in the lamp envelope, in a ratio of halogen to mercury of 0.08 to 0.75, these amounts being defined by the 50% level of intensity of a plot of intensity versus halogen/mercury ratio. The *Reiling* prior art reference disclosed a similar device, and also sought to produce white light. Appellants calculated the halogen/mercury ratio of *Reiling's* examples, and found them to range from 0.0000001 to 1.3. However, no example with a ratio

of 0.08 to 0.75 was disclosed by *Reiling*, who also failed to suggest that the ratio might be important.

In *Waymouth*, the claimed range was 0.08 to 0.75, while the prior art range was close to zero to 1.3. Thus, the *Waymouth* range overlapped that of the prior art to the degree of about 52%, and despite being for the same purpose, the CCPA found the Waymouth claims to be nonobvious. Here, the claimed range is only about 25% of the disclosed range; the purpose of *Geissler*, unlike *Reiling*, is different from that of the Applicants; and no examples of any kind, regardless of range, are disclosed by *Geissler*.

Under the standards set forth in the above cases, Applicant asserts that the claims meet the conditions for non-obvious subject matter under the law, and respectfully requests withdrawal of the rejection of the claims over *Geissler* under 35 U.S.C. § 102(e) and 103(a).

Applicants submit that the claims are now in condition for Allowance, and respectfully request a Notice to that effect. If the Examiner believes that further discussion will advance the prosecution of the Application, she is highly encouraged to telephone Applicants' attorney at the number given below.

Respectfully submitted,

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Date: September 23, 2003

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